

NOTE ON THE MECHANISM OF POLLEN RELEASE IN *BRUGUIERA GYMNORRHIZA*

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ABSTRACT

The mechanism of pollen release in the mangrove tree *Bruguiera gymnorhiza* (L.) Lam. is described. Attention is drawn to the role played by pollinating agents and to the morphological and anatomical adaptations of the petal which facilitate pollen dispersal.

UITTREKSEL

NOTA AANGAANDE DIE MECHANISME VAN STUIFMEEL VERSPREIDING IN *BRUGUIERA GYMNORRHIZA*

Die meganisme van stuifmeel verspreiding in *Bruguiera gymnorhiza* (L.) Lam. word bespreek. Aandag word gegee aan die rol van bestuiwers en die morfologiese en anatomiese aanpassings van die blomblare wat verspreiding bevorder.

OBSERVATIONS AND DISCUSSION

During a recent visit to the Mangrove swamps at Mtunzini and at Beachwood, Durban, my attention was drawn to the flowers of *Bruguiera gymnorhiza* which have an interesting mechanism for pollen release. This mechanism has been described in *Bruguiera eriopetala* W. et A., a South West Asian species, but little appears to be known of pollen release in *B. gymnorhiza*. Lewis (1956) noted an explosive release of pollen from the petals of these flowers and it is the purpose of this paper to outline some aspects of this mechanism.

The flowers of *B. gymnorhiza* are borne among the terminal leaves of lateral branches (Fig. 1A). The nine to fifteen sepals are green or red-brown in colour and alternate with a similar number of brown conduplicate petals. The stamens lie in two rows, two stamens opposite each petal. In the bud and newly opened flower each petal encloses two stamens (Fig. 1B). In the young bud the filaments are straight but later as the bud matures these elongate and become curved in a characteristic manner (Fig. 1D). This is in contrast to *B. eriopetala* where the filaments are coiled (Gehrmann, 1911). Due to the elongation and folding of the filaments the anthers push against the enfolding petal. The anthers mature just before the flower opens, releasing some of their pollen into the chamber provided by the petals. This phenomenon facilitates pollen release as the pollen grains are free and thus can be thrown more easily from the chamber.



FIG. 1.

The floral structure of *Bruguiera gymnorhiza*.

- A. Pendulous flowers of *Bruguiera gymnorhiza*.
- B. Longitudinal section through a bud showing straight filaments.
- C. Longitudinal section through an open flower showing the cupular nectary with overlying hairs.
- D. Longitudinal section through the conduplicate petal showing the curved arrangement of the filaments. The arrow indicates the sensitive region of the petal.
- E. The flower with all stamens released.

When the bud opens the petals are revealed still enclosing the stamens. A ridge runs along the margin of each petal. This is more prominent at the base where there is a tuft of strong setose hairs. Similar hairs occur along the margins of the petal, on the midrib just behind the anthers, and on the inner surface of the petal in close proximity to the base of the filaments. The petal has a heavily cuticularised epidermal layer through which run a number of vascular strands. The thickening and cuticularisation of the epidermal cells are not uniform. Those cells on the ridges along the margin of the petal are thinner walled and not as heavily cuticularised as the other epidermal cells. The hairs are unicellular lever-like structures, the basal portion forming an integral part of the epidermis (Fig. 2). The hairs at the base of the petal and the heavily ridged region just above the hairs are very sensitive (Fig. 1D). Deflection of the hairs, or a slight pressure in the sensitive region above them with a dissecting needle will cause the petal lobes to spring apart releasing the stamens and a puff of pollen.

In nature pollinating agents are responsible for triggering this mechanism. Bees were observed receiving a shower of pollen over their bodies. Sunbirds were also seen visiting these flowers, pushing their heads well into the flowers in order to gather nectar. The flowers produce copious amounts of nectar. This is contained in a cupular nectary which is partly covered by long sensitive hairs emanating from the base of the petals (Fig. 1C). The nectar contains mainly glucose and some fructose. The nectary wall contains large areas of phloem which probably facilitates the accumulation of nectar.

The manner in which the petals spring open is dependent on a number of factors:

1. the forward and downward movement of the petal as a result of the pressure exerted by the pollinator on the hairs overlying the nectary at the base of the petal,
2. the subsequent pressure of the anthers on the upper margins of the enclosing petal,
3. the rapid unfolding of the filaments,
4. the pressure of hairs behind the anthers on the anthers themselves as the petal opens, and
5. the instability of the petal. The thinner walled epidermal cells along the ribbed margin of the petal become dehydrated after the flower has opened, resulting in a slight outward curvature of the margins. The more heavily cuticularised and thickened epidermal cells become taut. Consequently the margins of the petal spring apart explosively when the hairs at the base of the petal are deflected.

Pollen is not released from all the conduplicate petals of a flower during a

single visit of a pollinating agent. However, after three to six days when all the pollen has dispersed (Fig. 1E) the petals and stamens abscise.



1.3 μ
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FIG. 2.

A section of the epidermal region along the petal margin.

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